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| <b>Devi Ahilya University, Indore, India<br/>Institute of Engineering &amp; Technology</b> |  |  |          | <b>IV Year B.E. (INFORMATION<br/>TECHNOLOGY)</b> |                |          |          |              |
| <b>Subject Code &amp; Name</b>   |  | <b>Instructions Hours per<br/>Week</b> |          |  | <b>Credits</b> |          |          |              |
| <b>ITR8E1<br/>Blockchain Architecture<br/>Design and Use Cases</b>                         |  | <b>L</b>                               | <b>T</b> | <b>P</b>   | <b>L</b>       | <b>T</b> | <b>P</b> | <b>Total</b> |
| <b>Duration of Theory<br/>Paper: 3 Hours</b>   |  | <b>3</b>                               | <b>1</b> | <b>2</b>   | <b>3</b>       | <b>1</b> | <b>1</b> | <b>5</b>     |

**Learning Objectives:**

1. To understand real use cases for Blockchain.
2. To Create Blockchain network with existing tools and framework.
3. To Understand the Blockchain architecture and framework.
4. To Understand Blockchain tools for blockchain development.

**Prerequisites: Basic programming knowledge, Basic Fundamentals of Blockchain.**

**Course Outcome (CO):**

| <b>CO.No.</b> | <b>CO</b>  | <b>PO</b>                     |
|---------------|--|-------------------------------|
| <b>CO1</b>    | Understand the history, architecture, and key cryptographic primitives of blockchain technology, and recognize its potential applications across various industries.   | PO-1, PO-2, PO-3, PO-4, PO-5  |
| <b>CO2</b>    | Explain the concept of distributed consensus in blockchain systems, focusing on algorithms like Proof of Work, RAFT, and their application in permissioned and permissionless blockchains.                                     | PO-1, PO-2, PO-3, PO-5, PO-7  |
| <b>CO3</b>    | Demonstrate practical knowledge of how blockchain technologies, specifically Hyperledger Fabric, are applied in enterprises, including transaction flow, membership management, and network setup.                             | PO-1, PO-2, PO-3, PO-5, PO-12 |
| <b>CO4</b>    | Analyze the role and impact of blockchain technology in the financial sector, with applications in payments, secure trading, compliance, and global trade.   | PO-1, PO-2, PO-3, PO-6, PO-7  |
| <b>CO5</b>    | Understand blockchain security measures, including access control, privacy, and membership management in Hyperledger Fabric, and explore the integration of blockchain with AI and development tools like Ethereum and Quorum. | PO-1, PO-2, PO-3, PO-5, PO-8  |

**CO-PO Relationship:**

| <b>CO</b>  | <b>PO-1</b> | <b>PO-2</b> | <b>PO-3</b> | <b>PO-4</b> | <b>PO-5</b> | <b>PO-6</b> | <b>PO-7</b> | <b>PO-8</b> | <b>PO-9</b> | <b>PO-10</b> | <b>PO-11</b> | <b>PO-12</b> |
|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|--------------|--------------|
| <b>CO1</b> | 3           | 3           | 2           | 2           | 3           | -           | -           | -           | -           | -            | -            | -            |
| <b>CO2</b> | 3           | 3           | 2           | -           | 3           | -           | 2           | -           | -           | -            | -            | -            |
| <b>CO3</b> | 3           | 3           | 2           | -           | 3           | -           | -           | -           | -           | -            | -            | 2            |
| <b>CO4</b> | 3           | 3           | 2           | -           | -           | 2           | 2           | -           | -           | -            | -            | -            |
| <b>CO5</b> | 3           | 3           | 2           | -           | 3           | -           | -           | 2           | 2           | -            | -            | -            |

## Course Contents

### Unit-I

Introduction to blockchain: Introduction: History, basics, architecture conceptualization, crypto Primitives

### Unit-II

Basics, distributed consensus, consensus in bitcoin, permissioned blockchain, basics, consensus, RAFT consensus, byzantine general problem.

### Unit-III

Blockchain for enterprise-overview, components hyperledger fabric and transaction flow, membership and identity management, hyperledger fabric network setup, blockchain use cases.

### Unit-IV

Blockchain in financial series: payment and secure trading, compliance and mortgage, financial trade, global trade.

### Unit-V

Blockchain security: Overview, membership and access control in fabric, privacy in fabric, fabric side DB, blockchain and AI, blockchain ecosystem, ethereum, ethereum development tools and cluorum.

### Learning Outcomes:

1. Explain the fundamentals of mobile computing and differentiate it from mobile communication while understanding adaptability mechanisms and models like Transcoding Proxy, Odyssey, and Rover.
2. Describe and analyze mobility management techniques, including location management, caching strategies, and Mobile IP, and apply them in real-world scenarios.
3. Evaluate data dissemination and management techniques, including publish-subscribe models, caching mechanisms, and mobile web caching, to optimize mobile data access.
4. Demonstrate the role of context-aware computing in mobile environments by designing adaptive applications using middleware frameworks and intelligent agents.
5. Implement service discovery mechanisms while addressing key challenges such as advertisement protocols, event handling, security, and interoperability in mobile systems.

### Books Recommended:

- Block chain Technology, By steve tale
- Block chain revolution,by Don Tapscott & Alen Tapscott
- Blockchain Blueprint,By Ray Toffler

Learning Outcomes: Upon Completing the Course student will learn the function of Blockchains as a method of securing distributed ledgers, how consensus on their contents is achieved, and the new applications that they enable. It covers the technological underpinnings of blockchain operations as distributed data structures and decision making systems, their functionality and different architecture types.